CHAPTER

2

METRICATION UPDATE

Metric update of this chapter has been postponed until the National/State Policy and Guideline Criteria is established and approved by the AASHTO Bridge Committee. AASHTO and other national manuals (MUTCD, Recording and Coding Guide, Manual for Condition Evaluation of Bridges, NBI/NBIS/FHWA transmittals and directives, truck size and weight issues) are not completed and not expected to be published or available to the States. In the near future the Department's policy will be developed after we receive the National/State policy. Until such time, this chapter will remain in English system although all other chapters in the manual have been converted to metric.

BRIDGE REPLACEMENT PROGRAM

METHOD FOR SELECTING AND PROGRAMMING BRIDGES FOR REPLACEMENT AND REHABILITATION

The priority for the selection of bridges for replacement or rehabilitation with federal bridge replacement funds is established by the following three (3) parameters:

1. Structural adequacy

2. Functional adequacy and serviceability

3. Essential for public use

More specifically, the following information is compiled to make up the above referenced parameters: structural deficiency, posted bridges (weight limits below statutory limits), traffic count (ADT), class of highway, available detour routes, bridge geometry (particular bridges < 20' wide), bridge inspection reports, and district recommendations for replacement (submitted annually).

The Federal Highway Administration has developed a formula for prioritizing bridges that evaluates the above parameters, and provides an overall rating for the bridge called the "sufficiency rating". The sufficiency rating assigns a numerical value ranging from 0 to 100 to a given bridge with the following percentage points applied to each parameter:

Structural adequacy	55
Functional adequacy and serviceability	30
Essential for public use	15
	100

A bridge must be at least 20' in length to qualify for replacement or rehabilitation funds. For the purpose of applying the National Bridge Inspection Standards (Code of Federal Regulations 23 Hwy. Part 650) and the Federal Highway Bridge Replacement and Rehabilitation Program (HBRRP) and in accordance with the AASHTO Highway Definitions Manual. A "bridge" is defined as a structure including supports erected over a depression or an obstruction such as water, highway or railway and having a track on passageway for carrying traffic or other moving loads, and have an opening measured along the controls of the roadway of more than 20 feet between undercopings of abutments, or string lines of arches or extreme ends of openings for multiple boxes. It may also include multiple pipes where the clear distance between openings is less than half of the smaller contiguous opening. See sketch on page 2 (6) for defining length L.

A sufficiency rating of less than 50 and classification as structural deficient or functionally obsolete is required to qualify a bridge for replacement, whereas, a sufficiency rating of less than 80 will qualify a bridge for rehabilitation. Although the sufficiency rating accounts, in large degree, for the factors mentioned above, a subjective review of all pertinent data is followed in the selection process. Most of the information mentioned above is available on the computer (CICS - STRM mainframe database file), and can be obtained from the Department's Bridge Maintenance Section. This information can be grouped and sorted as required to aid in the bridge selection process. The following is a discussion of the three major parameters:

Structural Adequacy

This is determined from a list of posted bridges, bridge inspection reports, district recommendations, and is part of the sufficiency rating. This is the most important factor in the evaluation process as a bridge failure could be catastrophic. The actual field conditions of the bridge are determined by reviewing the bridge inspection reports. The recommendations from the districts, which reflect first hand knowledge of the relative condition of the various bridges in their jurisdiction, are also very helpful in determining structural adequacy.

Functional Adequacy and Serviceability

This is determined from the bridge inspection reports, district recommendations, and is part of the sufficiency rating. The geometry of the bridge is evaluated in the bridge inspection report. Generally, the most important factor of the bridges' geometry is the clear roadway width. Narrow bridges, if they are structurally adequate, can be widened rather than replaced. Serviceability is related to factors like stream scour, maintenance of movable bridges, and deck deterioration, etc. The frequency and severity of marine, railroad and automotive traffic accidents are also important factors. They are reflected in the bridge inspection reports and district recommendations.

Essential for Public Use

This is determined by the traffic count, class of highway, available detour routes, and is part of the sufficiency rating. The structural and functional adequacy of the bridge is evaluated in conjunction with the traffic count in order to minimize the exposure of motorists to unsafe conditions. If two bridges exist with the same degree of inadequacy, the one with the higher volume of traffic would receive the greatest priority. Additionally, if the bridge is on a truck or school bus route or crosses a major river or stream, it would, similarly, receive extra attention. Non-redundant routes (those without available detours) would have a higher priority than redundant routes.

Although there are numerous ways that the referenced data can be used in the selection process, one recommended procedure involves the compilation of three lists:

1. Bridges with the lowest sufficiency rating.

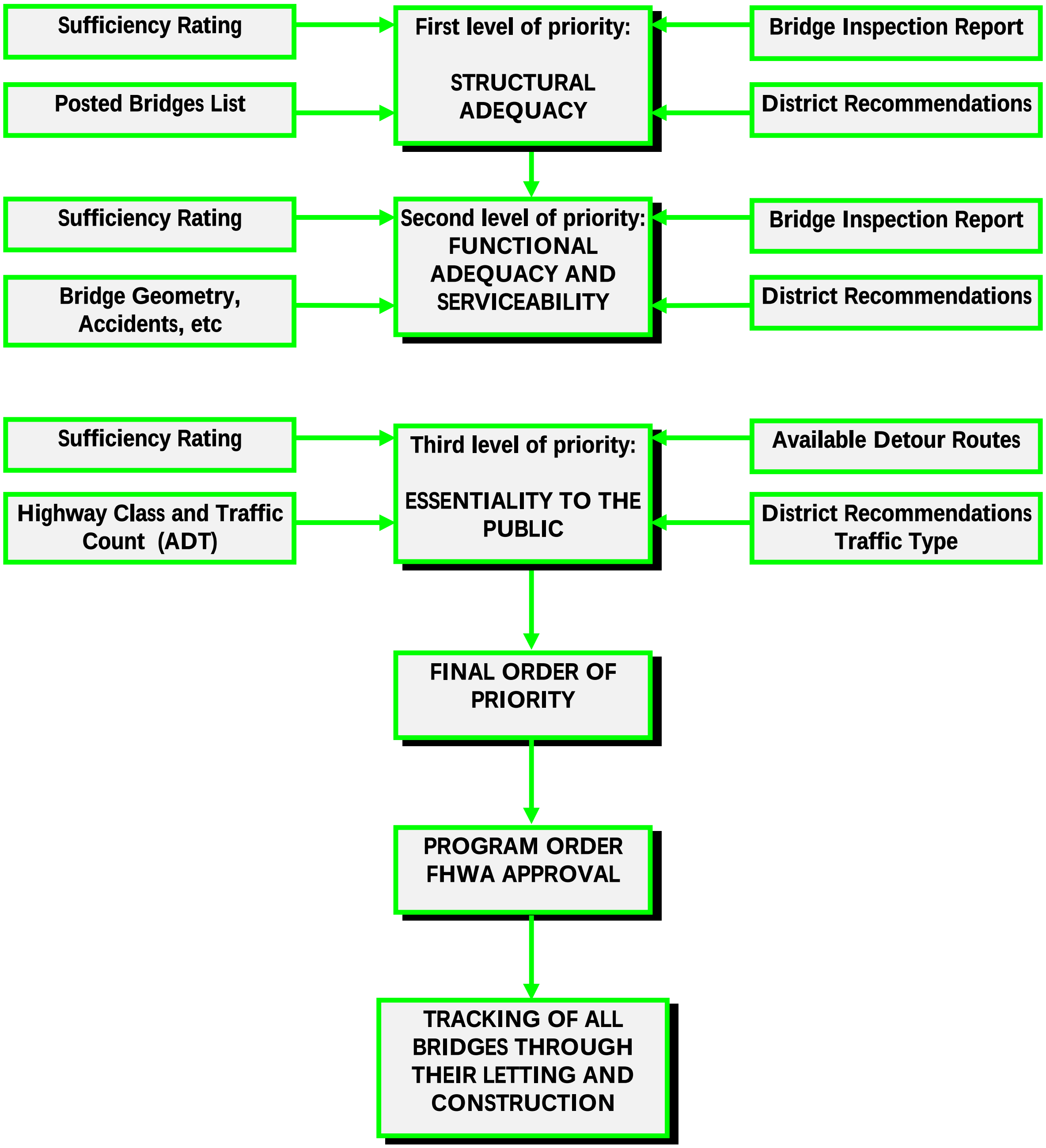
2. Bridges with the highest priority district recommendations.

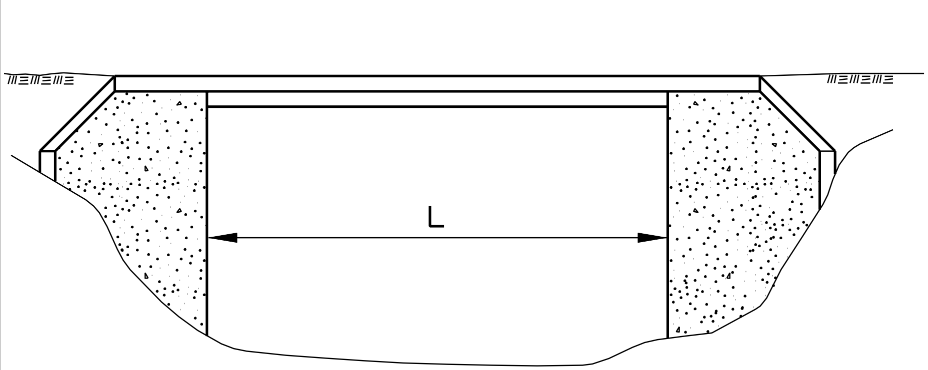
3. The most severely posted bridges.

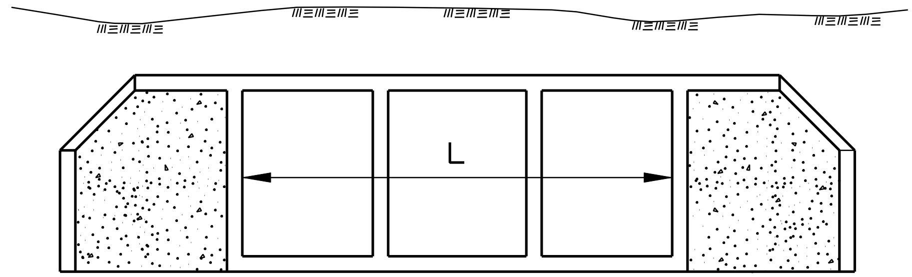
Generally, if a bridge appears on all three of these lists, it will have a high priority for replacement. All of the information previously mentioned should be considered when compiling these lists. It is important to achieve some degree of balance between the number of bridges replaced or rehabilitated in each district. Grouping of bridges into projects is another consideration. For example, if a bridge on a section of highway has a lower priority for replacement than other structures on either side of it, serious consideration should be given to including it with the other bridge replacements. If the structure does not qualify for bridge replacement (sufficiency rating of > 50) but is deemed in need of replacement by the bridge engineer, optional funding (NHS, STP or State) will be necessary

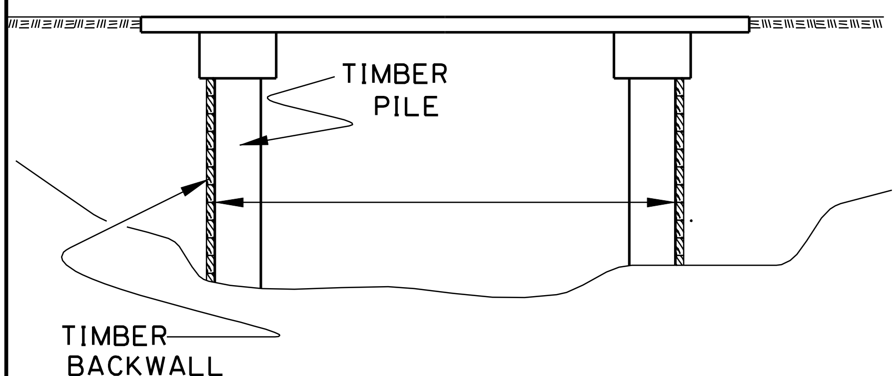
In some instances, it may be desirable to schedule field trips to inspect various bridge sites to obtain a more adequate understanding of their relative priority. Close communication with the districts is desirable.

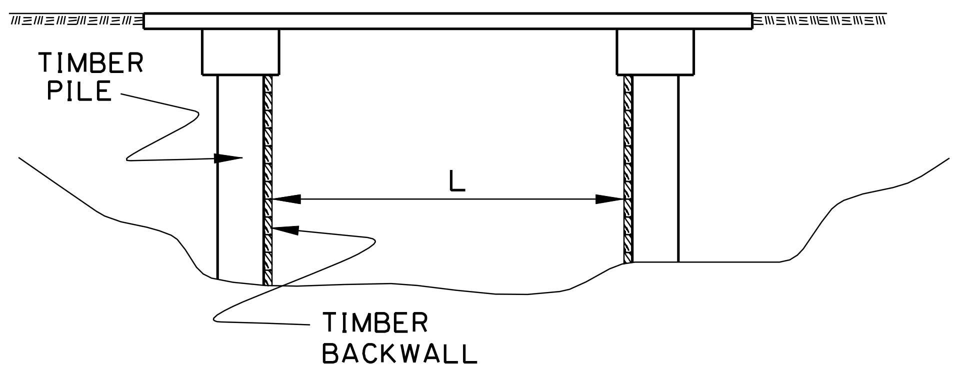
Selection of Bridges In Need of Replacement and Rehabilitation Flow Chart

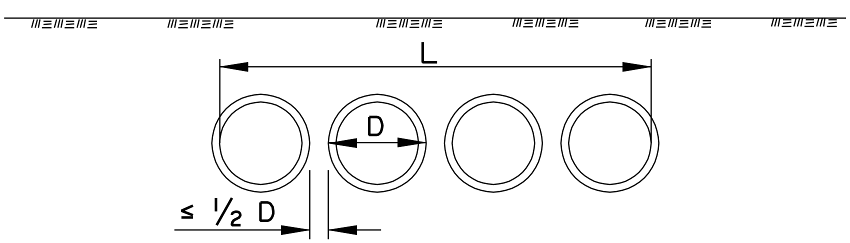












NOTE: IF L ≥ 6.1m, THE STRUCTURE IS CONSIDERED A BRIDGE AND THEREFORE ELIGIBLE FOR FEDRAL BRIDGE REPLACEMENT FUNDS.

NBIS DEFINITION

STRUCTURE "BRIDGE" LENGTH MEASUREMENT CRITERIA

RATING AND INSPECTION OF BRIDGES DEFINED

Louisiana is in compliance with FHWA/AASHTO requirements. The Bridge Design Section is responsible for rating all structures on the State Maintained System. All bridge structures are rated at two stress levels (inventory and operating). Any structure that has an operating stress rating of less than 3.0 tons will be recommended for closure to any vehicular traffic. The Bridge Maintenance Section is responsible for establishing the bridge inspection policy. All Louisiana bridges are inspected at two-year maximum intervals. It is the responsibility of the city or parish authority to rate off-system structures within its jurisdiction. Presently all timber span structures are rated by our Bridge Maintenance Section. If a bridge is not capable of carrying statutory loads, it is posted for a lesser weight limit in accordance with EDSM 1.1.1.8. Most structures in poor condition are re-rated in accordance with EDSM 1.1.1.15.

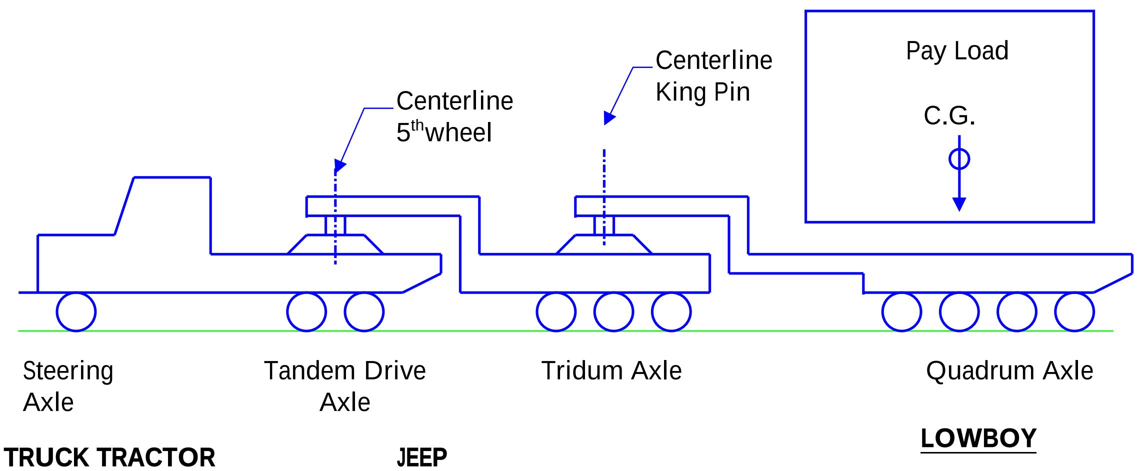
INVESTIGATION OF OVERWEIGHT VEHICLES

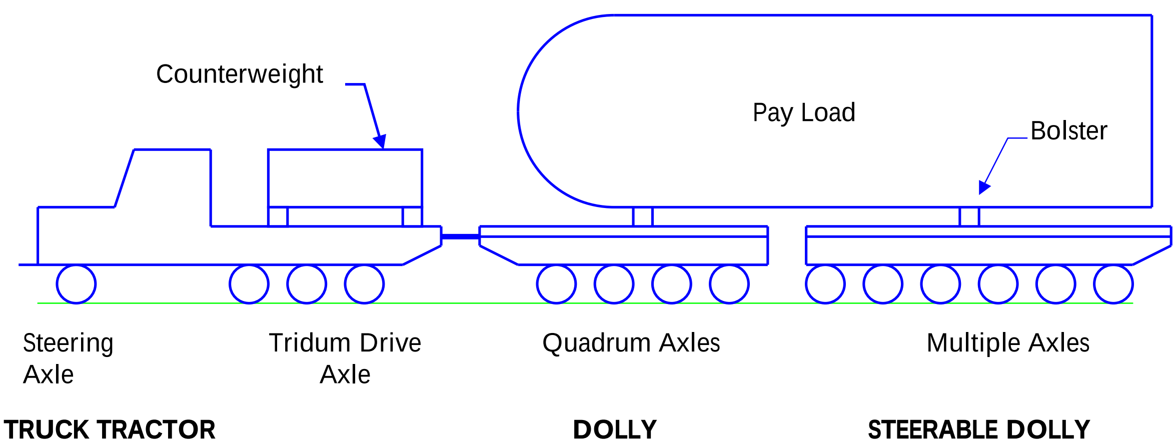
INTRODUCTION

The Truck Permits Office requests an investigation by the Bridge Design Section for a proposed passage of an overweight vehicle. They grant a permit based on the recommendation of Bridge Design that will specify the use or conditional use of any bridge involved. Presently, bridge design only reviews vehicles that weighs in excess of 254,000 pounds and/or that have an axle weighing in excess of the legal maximum allowable amount as given in the latest "Louisiana Regulations for Trucks, Vehicles, and Loads" published by the Louisiana Department of Transportation and Development. The proposed vehicle combination is reviewed, and then the bridge or bridges involved are structurally analyzed for the resulting capacity with according to the AASHTO Design Specifications and the AASHTO "Manual for Condition Evaluation of Bridges".

Review of the Proposed Overweight Vehicle:

TWO TYPICAL OVERWEIGHT VEHICLE COMBINATIONS





TERMINOLOGY

General definitions are given in the previously mentioned references and AASHTO's "Recommended Policy on Maximum Dimension and Weights of Motor Vehicles to be Operated Over the Highways of the United States". Some specific definitions are as follows:

a) A vehicle is a device in, upon, or by which any person or property may be transported or drawn upon a highway except devices powered by humans or used exclusively on stationary rails or tracks.

b) A hauling unit is a combination of vehicles connected together in a series.

c) A tractor is a motorized vehicle, which steers and propels the vehicle combination.

d) A lowboy is a low, usually flat platform upon which the payload is placed.

e) A jeep is a vehicle connected between the tractor and the lowboy when necessary to distribute one reaction from the lowboy to more axles than provided by the tractor.

f) A dolly is a low, flat platform upon which one end of the payload is placed.

g) A booster unit is one or more axles mechanically attached to the rear of a vehicle as a unit to provide a lifting effect to the rear and increase the number of effective axles. It can be a temporary or permanent addition.

h) A connection is a load transfer point which consists of a kingpin and a fifth wheel and which allows rotation and easy assembly.

i) A kingpin is usually a steel pin located in the gooseneck of a lowboy or jeep, which is inserted into the center of the fifth wheel. Its location is often adjustable.

j) A fifth wheel is a disc located over or forward of the rear tractor axles and forward of the jeep unit's axles, is usually attached through a hinge mechanism to the frame of its unit, and is designed to accept loads transferred from the gooseneck. It allows the trailing unit to swivel about the kingpin and its location is often adjustable.

k) The tare weight is the weight of the vehicle.

l) The pay weight is the weight of the load to be carried and is often referred to as the payload.

m) The gross weight is the sum of the tare weight and the pay weight.

INFORMATION TO BE FURNISHED BY THE PERMIT REQUESTER

Trucking companies that apply for overweight permits are not always able to properly determine the vehicle combination and load configuration. Thus it is necessary that the permit requester submit the following information for the reviewer to verify the weight distribution to the axles. The tare weight, the pay weight, and the gross weight have to be given separately.

a) The location of the centerline of each axle

b) The location of the connections to the jeep and tractor

c) The location of the bolsters and other load points

d) The spacing and size of wheels on each axle

e) The length and width of flat beds

f) The maximum height of the loaded vehicle

g) The location and orientation of the payload on the vehicle

h) The overall dimensions of the payload to be hauled on the plan, side and end elevation views

i) The location of the center of gravity of the payload

j) The pay weight in pounds

k) The tare weight of each axle in pounds

l) Maximum tire load for each axle and

m) Centerline transverse spacing of each group of wheels

Tare weights can best be obtained by weighing the empty vehicle combination assembled. Occasionally this is not practical or convenient, and the weights of the individual components are used. For the purposes of checking, an estimated weight of axles can be used by assuming that each four-tire line axle weighs 2,000 pounds, increasing this weight by 500 pounds per each additional tire and then distributing the remainder of the weight equally between the kingpin and the axle group.

If there is confusion over the vehicle combination, there are three possibilities that may help: photographs of the various suspension systems and components, a manufacturer's drawing or a field trip may be necessary.

INFORMATION TO BE FURNISHED BY PERMIT OFFICE

A good quality copy of the state, parish, and/or city map marking the proposed route to ensure that the route to be reviewed is the correct one.

SUSPENSION SYSTEMS

a) A conventional mechanical system is a combination of levers and pins, which distribute loads evenly to the axles. The levers are referred to as "walking beams" and the pins are referred to as trunnions. This system is being replaced more and more by pneumatic and hydraulic systems, which are considered equal or superior to the conventional mechanical ones.

b) A pneumatic system distributes the load evenly to the axles by maintaining constant gas pressure. It becomes totally inoperative if it malfunctions, but otherwise it is considered fully capable of distributing the load as specified in the analysis section given below. The system reacts and adjusts quickly to pressure changes due to variations in the pavement elevation and, therefore, is used in vehicles that are driven at high speeds.

c) A hydraulic system operates similarly to a pneumatic system except it maintains constant fluid rather than gas pressure and does not react and adjust quickly to pressure changes due to variations in the pavement elevation. It is, therefore, used in vehicles that are driven at slow speeds that allow time for changes.

d) The suspension system for a booster unit can be independent from the vehicle to which it is attached and may be mechanical or pneumatic. Hydraulically suspended booster units are not allowed because of their inability to quickly adjust to variations in the pavement elevations.

The vehicles comprising the hauling unit may have the same or different types of suspension systems. A specific vehicle may have a hydraulically suspended booster unit while the rest of its system is a conventional mechanical one. Vehicle units are available. However, they are entirely suspended by pneumatic or hydraulic systems.

ANALYSIS

1. Locate the path across the bridge for the overweight vehicle that would create the least overall stress on the components of the bridge.

   a) For concrete decks, the location might be where the wheels are close to the longitudinal members and not centered between them.

   b) For longitudinal members, the location might be where the wheels are over the maximum number of the members.

   c) For roadways cantilevered from a central support, the location might be as near to the support as practical.

   d) Generally, the location is where the centerline of the overweight vehicle coincides with the centerline of the bridge.

2. Distribute the wheel loads according to engineering judgment.

   a) AASHTO wheel distribution factors are not applicable to the widely spaced four tire line axles (distance center to center of dual tires greater than 6'-0") or the eight tire line axles.

   b) For concrete decks, the transverse distribution can be taken as simply supported with a continuity factor applied and the longitudinal distribution as the analyst decides to be appropriate.

   c) For longitudinal members, the transverse distribution could be according to how the analyst thinks the members will carry it.

3. Ignore the booster units in the first analysis of bridges that are to carry the vehicle combination proposed and use them only if they are determined necessary to reduce the bridge stresses to an acceptable level. The amount of load transferred to a booster unit in a positive way is difficult to determine other than by obtaining the weight of the unit's axles deactivated and then fully activated on truck weighing scales. Since these add-on type axles are not necessary to the successful operation of the conventional units to which they are attached, it is possible for them to malfunction or, inadvertently, not be activated resulting in a much different distribution of the load. The first analysis will give the analyst insight to potential problems that a deactivated condition could cause.

4. Restrict or eliminate entirely the other traffic on a bridge during the passage of an overweight vehicle.

5. Reduce the live load impact determined according to AASHTO specification or eliminate it entirely by requiring the vehicle to proceed at crawl speed (5 mph or less) while on a bridge other than a timber one.

6. Do not subject timber bridges to a crawl speed by an overweight vehicle since impact is not a consideration and timber is adversely affected by the increased duration of load. A speed of 15 mph, or more, depending upon the smoothness and general condition of the bridge deck is appropriate.

7. Compute stresses in a bridge at an absolute maximum of the operating stress level. This may be reduced if justified by poor structural condition of a bridge that cannot be verified by physical examination and measurement.

8. Do not analyze bridge substructures and foundations as well as box culverts and pipes unless their capacity is in question due to the relative size or configuration of the proposed vehicle combination.

STRUCTURAL RATING OF BRIDGES

INTRODUCTION

Structural rating deals with determining the load carrying capability of a bridge. This determination is made based on information gained from an in-depth inspection of the structure and the review of the "as-built" plans. The ultimate result of structurally evaluating all bridges accordingly is to provide a uniform, relative, load carrying capacity of all bridges, accounting for their "as-built" and current conditions.

SCOPE

This article presents an approach to determining the live load carrying capacity of any given structure. It is limited to only the method and not a complete analysis of an entire structure in detail. The details of the analysis are governed by the "Manual for Condition Evaluation of Bridges" published by AASHTO, henceforth referred to as the manual.

COMMENTARY

Structural rating of bridges as presented in the manual leaves a great deal of latitude in approach and procedure. Bridges may be rated by any of several vehicle configurations which include the standard AASHTO live load, "typical" legal vehicle configurations presented in the manual, or the legal vehicle configuration of any given state.

The importance of the structural rating of bridges both qualitatively and quantitatively is to determine the relative strength and safety of all the bridges on a highway system for the more obvious reason to protect the motoring public. The information will allow planners to determine the critical structures on a route that may be repaired, modified, or replaced to upgrade the whole route and permit commercial truck traffic with the least restricted condition.

There are many philosophical approaches to rating bridges. Some states determine the carrying capacity of bridges in terms of the maximum legal vehicle and/or permit vehicle a bridge can carry. Another approach that has favor of the Department is the use of the standard AASHTO load configurations (lane loads and truck loads) which are based on the "H" or "HS" truck followed by a number which is linearly interpolated or extrapolated from the usual "H" and "HS" 15 and 20.

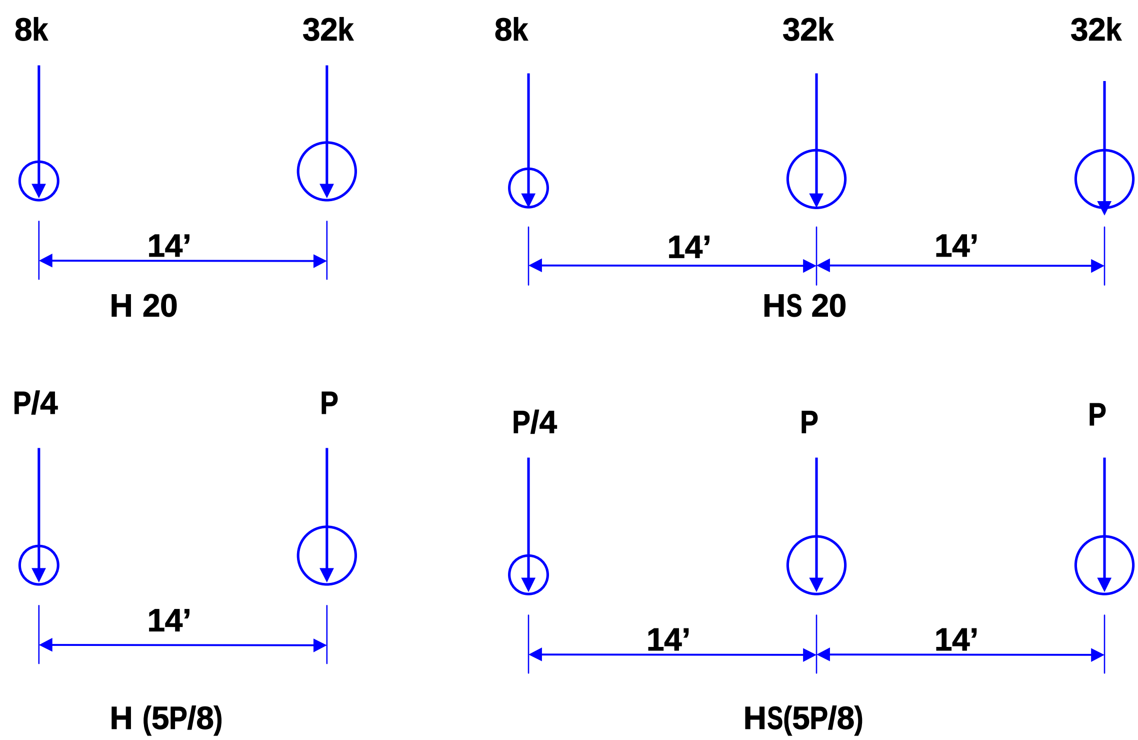
It is felt that the latter approach will realistically depict the relative strength of bridges and that it is more readily understood by other agencies which may have use for the data but may not be familiar with the State's legal load configuration. Due to the severe wheel weight application of the "H" and "HS" trucks, a third vehicle configuration is added to avoid unnecessarily severe posting restrictions on bridges.

ANALYSIS

1. The structural analysis of load carrying capacity of any particular bridge shall be limited to the structural carrying capacity of the prime structural members under normal loading. The loads to traffic rails, lateral systems, and such are not considered as normal loads. These items will be graded qualitatively.

2. The method of determining the "H" or "HS" truck load rating is as follows:

   a. The axle loads are in algebraic symbols in the same proportion and spacing as the "H" and "HS" loads.



   The H-20 truck is a 20-ton vehicle with two (2) axles with a rear to front weight ratio of four (4) to one (1). The HS-20 truck is a 36-ton vehicle with three (3) axles and rear to front axle ratios of 4:4:1. The 20 represents the sum of the weights of the front and adjacent axles in tons. The normal unit of weight for the axles is the kip or kilopound.

   b. The stress caused in each part of the structure is calculated in terms of "P", which includes live load and impact.

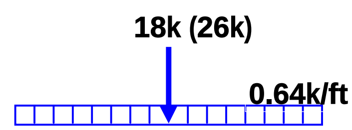
   c. The net maximum stress in the respective members is determined. This is the total allowable stress less the dead load stress that results in the stress reserved for live load and impact.

d. The net maximum stress and the stress in terms of "P" are equated and the value of "P" is determined in kips.

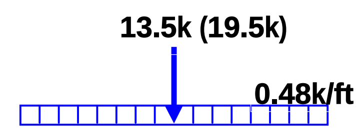
e. The "H" or "HS" number as used will be 5P/8.

3. The method of determining the "H" or "HS" lane loading is derived in a similar fashion as the trucks' loads. The loads are applied according to the applicable AASHTO Specifications as follows:

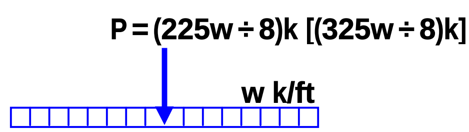
a. Lane Loads:



H20 and HS20



H15 and HS15



H(125w÷4) and HS(125w÷4)

b. The stresses in each part of the structure caused by the live load and impact are determined in terms of the uniform load "w" in kips per foot.

c. The net maximum stress in the respective members is determined.

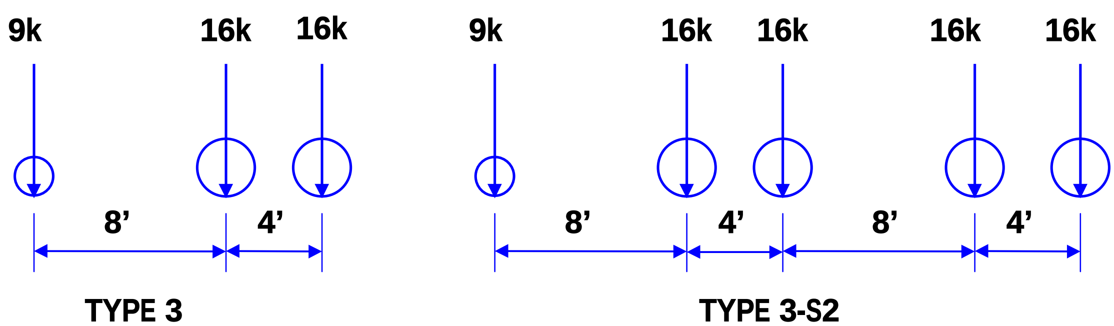
d. The net maximum stress and the stress in terms of "w" are equated, and the value of "w" is determined in kips per foot.

e. The "H" and "HS" number is calculated as 125w÷4.

4. The method of determining the "H" wheel load to bridge deck slabs will be computed as provided in the AASHTO specifications and as follows:

The same steps are used as described in computing truck loads under 2.b. through 2.d.

5. Posting vehicle configurations are utilized and evaluated similarly to the AASHTO "H" and "HS" vehicles and have the following configuration:



WEIGHT LIMITS FOR DEFICIENT BRIDGES IN LOUISIANA

INTRODUCTION

Louisiana law, as applicable to interstate highways, allows triple axle weights up to 42,000 pounds, maximum, tandem axle weights up to 34,000 pounds, maximum, single axle weights up to 20,000 pounds maximum, and a weight of 650 pounds per linear inch of tire tread width, maximum. For non-interstate highway see Louisiana Regulation for Trucks, Vehicles, and Loads. Assuming the typical truck tire to have a ten (10) inch tire tread width, the maximum steering axle weight could typically be 13,000 pounds. The maximum legal vehicle weight is 80,000 pounds with the exception of the Type 3-S3, which has a maximum legal weight of 88,000 pounds. Bridges which cannot accommodate these maximum legal loads must be provided with regulatory weight limits to protect the motoring public from their potential failure.

SCOPE

The method of determining which bridges are structurally deficient is presented herein with the procedures for placing regulatory weight limits upon them. Also, advisory weight limits are discussed.

COMMENTARY

Weight limits are required on all bridges found to be structurally deficient on the Federal Aid Highway System. This is established in Title 23 Highways, Part 650.303(C) National Bridge Inspection Standards of the Federal Register. It is the opinion of the Department's General Counsel that all bridges on the State maintained highway system which are known to be structurally deficient for carrying legal loads but not restricted to the appropriate weight limits are a legal liability to Louisiana if they were to result in loss of property or life.

The Department utilizes a policy of posting bridges for vehicles at one weight limit and combination of vehicles at another weight limit. Act 35 of the 1978 Louisiana Legislature created a non-standard sign for advisory weight limits as opposed to regulatory weight limits. The Department utilizes the advisory weight limits on bridges indicated in fair or better structural condition which require weight limits of fifteen (15) tons or more for vehicles and twenty-five (25) tons or more for combination of vehicles. All other bridges require regulatory weight limits. The posting of regulatory/advisory signs is in accordance with the EDSM 1.1.1.8.

Regulatory weight limits must be established legally. This is accomplished by filing the "Assistant Secretary's/Chief Engineer's Order" restricting the weight limits on a bridge in the Office of the Clerk of Court in the Parish in which the bridge is located. When the bridge is located on a Parish boundary, both Parish Clerks of Court must have the appropriate documents filed with them. Only then are the bridges in question legally posted and the appropriate authorities can enforce the weight limits.

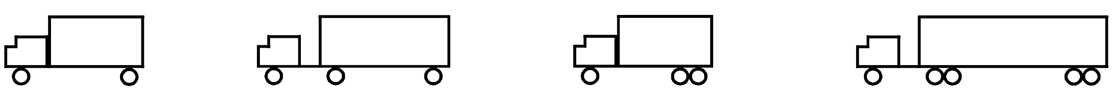
Advisory signs are not legally established and therefore not subject to enforcement. The only difference between the advisory weight limit signs and the regulatory weight limit signs is that there is not advance warning for advisory weight limits and the background color is yellow for the advisory sign as opposed to white for the regulatory sign.

ANALYSIS

The posting evaluation vehicles consist of the (H vehicle configuration) Type 2 vehicle, and Type 3 vehicle, the (HS vehicle configuration) Type 2-S1 vehicle and the Type 3-S2 vehicle. Bridges are rated for the operating rating stresses, which are higher than the original design stress values. The weight of the "H" or "HS" vehicle configuration along with the weight of the Type 3 vehicle or Type 3-S2 vehicle respectively are computed which will produce the operating rating stresses. If the computed weights of either or both vehicle configurations are less than the maximum legal weight for their configurations, the bridge requires weight limits in accordance to the EDSM 1.1.1.8.

The rating/posting evaluation vehicles are coded by a three (3) digit number. This code (e.g., 117, 228, 430, and 544) is demonstrated in the following Vehicle Types and Weight Limit Requirement Table (see page 2 (22). The first digit is designated as the Rating Vehicle Code and is unique to the vehicle type. The second two (2) digits are the gross vehicle weight to the nearest ton with leading zeros. This code is the same as specified in the "US DOT/FHWA Recording and Coding Guide".

Vehicle types



Vehicle type 2 Rating Vehicle Code 1	Vehicle type 2-S1 Rating Vehicle Code 2	Vehicle type 3 Rating Vehicle Code 4	Vehicle type 3-S2 Rating Vehicle Code 5

Computation of Rating Factors

The following expressions are used in determining the load rating of a structure based on the moment capacity.

(a) Load Factor Method

$$\text{Inventory Rating Factor} = RF_{INV} = \frac{\left[\frac{3}{5}\ \frac{M_u}{1.3} - M_{DL}\right]}{M_{LL}\,(1 + I)}$$

$$\text{Operating Rating Factor} = RF_{OPR} = \frac{\left[\frac{M_u}{1.3} - M_{DL}\right]}{M_{LL}\,(1 + I)}$$

Where: M_u = moment capacity of the structure
M_{DL} = moment due to dead load
M_{LL} = moment due to live load
I = the impact factor to be used with the live load

(b) Allowable Stress Method

$$RF_{INV} = \frac{\left[M_{INV} - M_{DL}\right]}{M_{LL}\,(1 + I)}$$

$$RF_{OPR} = \frac{\left[M_{OPR} - M_{DL}\right]}{M_{LL}\,(1 + I)}$$

Where: M_{INV} = moment capacity at the inventory level
M_{OPR} = moment capacity at the operating level

RT = Rating in tons = (RF) W

Where W = weight (in tons) of the truck used in determining the live load effect.

Example: If we have used HS20 truck and have obtained $(RF)_{INV}$ = 1.35 and

$(RF)_{OPR} = 2.25$,

Inventory Rating = (1.35) (36)
= 48.6
= 48 (Decimal portion is truncated)

Operating Rating = (2.25) (36)
= 81

If we have used the posting vehicle as Louisiana Type 3-S2 truck and have obtained
$RF_{OPR} = 2.54$

Posting Rating = (2.54) (36.5)
= 92.7
= 92 (Decimal portion is truncated)

NBIS (National Bridge Inspection Standard) code for Rating:

For Inventory and Operating ratings, add the digit 2 in front of the rating value in tons, if the HS20 truck is used.

For Posting rating, add the digit 5 in front of the rating value in tons.

Rating for the above example in NBIS Format:

Inventory: 248

Operating: 281

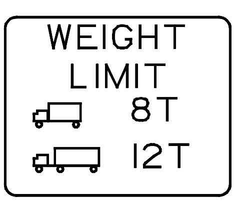
Posting: 592

BRIDGE WEIGHT LIMIT REQUIREMENTS TABLE

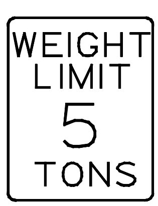
Operating Rating Limit Range or Value	Posting Vehicle Range or Value	Weight Requirements
100 - 102	400 - 402	Type IV (closed)
103	403	Type III (03T)
104	404	Type III (04T)
105 - 109	405 - 409	Type III (05T)
209 - 214	509 - 514	Type II (05T)
110 - 114	410 - 414	Type II (10T - 15T)
215 - 224	515 - 524	Type II (10T - 15T)
115 - 117	415 - 419	Type II (15T - 25T)
225 - 228	525 - 534	Type II (15T - 25T)
118 - 119		Type II (15T - 25T)
229 - 234		Type II (15T - 25T)
120 - 124	420 - 424	Type II (20T - 35T)
235 - 239	535 - 539	Type II (20T - 35T)
125 - 129	425 - 429	Type II (25T - 40T)
240 - 243	540 - 543	Type II (25T - 40T)
130 - 199	430 - 499	No Limit
244 - 299	544 - 599	No Limit

The table shows the rating requirements for the State of Louisiana. Select the lower weight limit requirement for the operating and posting vehicle for operating rating values above double line. Select the higher weight limit for the operating and posting vehicle for operating rating values below double line.

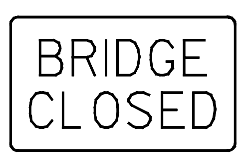
EXAMPLES OF POSTING SIGN LEGENDS



TYPE II



TYPE III



TYPE IV

BRIDGE RATING AND PERMIT LOAD REVIEW PROCEDURE REFERENCE LIST

1. AASHTO Virtis and BRASS/BARS computer program manuals and software.

2. AASHTO "Guide for Maximum Dimensions and Weights of Motor Vehicles and for the Operation of Non-Divisible Load Oversize and Overweight Vehicles", Rev. 1988.

3. AASHTO "Manual for Condition Evaluation of Bridges", 1994 and Interim Specifications.

4. AASHTO "Standard Specification for Highway Bridges", Sixteenth Edition, 1996 and Interim Specifications.

5. Bridge Gross Weight Formula, U.S. Department of Transportation and FHWA Publication, 1982.

6. Bridge Rating Procedure and Policy Guide Manual, 1988 (prepared by LA DOTD Bridge Rating Unit).

7. Code of Federal Regulation "23 CFR 650", Rev. 1988.

8. Engineering Directives and Standards Manual (EDSM) 1.1.1.8, & 1.1.1.15 for Posting and Frequency of Re-rating Policy.

9. FHWA "Bridge Inspector's Training Manual 70", 1979.

10. FHWA Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges, 1988.

11. Louisiana Legislative Act 35 of 1978 for Posting Advisory Weight Limit Signs.

12. Louisiana Legislative Act 686 of 1987 (House Bill No. 1542) for Compliance of Bridge Formula.

13. Louisiana Legislative Act 1342 of 1997 (Senate Bill No. 792) for Permit Vehicle, Gross Vehicle Weight, and Axle Load and Spacing Limitation.

14. Louisiana Recording and Coding Guide for the Structure Inventory and Appraisal of the State Bridges, 1979.

15. Louisiana Regulation for Trucks, Vehicles and Loads, Fourteenth Edition, 1995, and Multi-State Permit Agreement for Oversize and Overweight Vehicle, 1996.

16. National Bridge Inspection Standards - Transmittal 427, 1989.

17. Timber Construction Manual, latest edition, and USDA Forest Service Timber Design Specifications.

NOTE: All of the above references are available in the Rating Unit Office.